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Relationship of personality and job satisfaction for engineer-turned-managers

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RELATIONSHIP OF PERSONALITY AND JOB SATISFACTION FOR ENGINEER-TURNED-MANAGERS

A Thesis

Presented to

The Faculty of the Department of Psychology

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by

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ABSTRACT

RELATIONSHIP OF PERSONALITY AND JOB SATISFACTION FOR ENGINEER-TURNED-MANAGERS

by Hung S. Nguyen

The differences in dominance and sociability personality factors between engineers ($\underline{n} = 43$) and engineer-turned-managers ($\underline{n} = 13$) were investigated. In addition, the relationship between personality factors and job satisfaction for the two groups was examined. Two instruments, the Personality Research Form and the Job Descriptive Index, were used in the present study to measure personality factors and job satisfaction levels, respectively. The results indicated that the engineer-turned-manager group had a significantly higher score on the dominance personality scale than the engineer group. There was no significant difference in the sociability factor between the two groups. There were no significant relationships between job satisfaction and personality factors for both groups. Those findings that are significant could be used to strengthen management training for engineer-turned-managers and to aid in prediction of potential for success when engineers consider transitioning into management roles.

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Relationship of Personality and Job Satisfaction for Engineer-Turned-Managers

Transition has become a regular feature of the modern employee's career. Professionals are expected to switch careers, get promoted and/or change organizations as part of their work lives. According to Badawy (1981), the majority of individuals who work as engineers will have become managers by the time they reach the middle stages of their careers. The reason for this shift in careers can be attributed to the fact that people are motivated by the higher organizational status, authority, and income-benefits that become available only at the management level (Badawy, 1983; Bailyn, 1980; Roth, 1982; Sherman, 1989). In the field of engineering, this shift in occupational goals has generated wide interest as well as concerns within organizations. The concerns stem from the fact that good engineers are leaving their jobs to become managers, but the transition is not always successful. The differences between successful and unsuccessful manager has been studied in the past. Barrick and Mount (1991) researched this relationship between five personality dimensions and job performance. In their meta-analysis, they found that the Extraversion personality dimension was a valid job performance predictor for occupations in sales and management. The Extraversion personality dimension included traits such as sociability and ambition.

The question examined in this study is more narrow: will personality factors

predict job satisfaction among engineers and engineers-turned managers? And are there measurable personality differences between the two groups?

Regardless of their potential for successful performance as managers, engineers continue to be pulled into the path of management (Keenan, 1994; Rynes, 1987). Successful engineers are attracted to the pull of management because of the rewards. In contrast, unsuccessful engineers are drawn to management for reasons such as boredom and frustration. Sometimes poor performance is an issue when engineers are unable or unwilling to keep up with the technological demands of the job. This is especially true for professionals who have been working for more than 10 years as engineers, and who see management as the next step to further achievement (Bailyn & Lynch, 1983; Keenan, 1994). One of most common complaints about management ladders, from both employees and supervisors, is that they are populated with failed engineers rather than high technical achievers (Roth, 1982).

For others, including technically successful engineers, promotion is seen as the only way to climb the corporate ladder. Not all engineers who go into management are happy in their new arena. As one engineering manager reported, he is "not as happy" as he was before his promotion. "I never had ambitions towards management. I enjoyed technical work very much. Now I am sad all the way to the bank"(Bailyn & Lynch, 1983, p.264). This demonstrates the predicament of some of the engineer-managers in today's

organizations. The status, money and power to move to the upper rungs of the corporate ladder motivate them. However, when they achieve their goal, they realize it frequently not what they want.

This career change scenario is of concern not only for individuals, but also for organizations. These engineer-turned-managers may lack the skills and training to effectively handle managerial tasks (Hogan, 1994; Levinson, 1994). These deficiencies can prove to be detrimental to the organization, resulting in these managers failing to perform their required duties. Badawy (1983) demonstrates this to be true in his research, which shows that there is a significant rate of performance failure among engineer-turned-managers. They were often late with their tasks, such as filling out paper works and were often unable to complete assigned projects by the required time. The performance failures of engineer-turned-manager are often the product of lack of preparation and training for the new managerial role, when the technical person has been promoted due to technical achievement only. This employee often lacks the necessary training and skills to successfully perform administrative duties. In promoting this type of employee to managerial responsibilities based solely on technical achievement, the company has lost one valuable technical asset and gained one poor manager.

Engineering vs. managing

Engineering and managing have been viewed as two substantially different

occupations (Hogan, 1994; Levinson, 1994; Perry & Cannon, 1967). A job analysis comparing the general task of engineers and managers found that the engineer performs tasks of a technical nature, calling for precision, mathematical ability, and the application of well proven, precise theory (Hogan, 1994; Levinson, 1994). Engineering stresses the mechanical approach to problem solving and the need to find a single, lasting solution in an environment of high certainty and little change. On the other hand, managers have been described as 'divergers'. This group performs tasks of planning, organizing, directing, and controlling resources in a world of constant change and uncertainty (Bailey & Lynch, 1983). Another factor that differentiates engineers and managers is that engineers tend to dislike doing administrative work (Brown, Grant & Patton, 1981; Sedge 1985).

In this context, it is not difficult to see that an engineer might not be happy doing managerial administrative tasks. Thus, one can propose that highly competent engineers would not be satisfied if they have to perform administrative tasks required of a manager. Another marked difference between the engineer and the manager is the required interpersonal relation skills and the willingness to make difficult decisions about other employees such as promotion, firing, and lay-offs of supervised employees (Al-Faleh, 1993; Levinson, 1994).

Other researchers have confirmed and elaborated on these group differences. The

National Aeronautical and Space Administration (NASA) and the National Institutes of Health (NIH) interviewed 610 engineers and scientists in analyzing three dimensions of management: a) functions or tasks to be performed, b) skills and abilities used in performing the tasks, and c) motivations that give positive or negative meaning to the managerial role (Bayton & Chapman, 1977). The findings indicated that technical managers experience difficulty in these three major areas. First, motivation or reward systems for a manager may be in direct conflict with those for an engineer. For example, an individual with a high need for autonomy or independence might find working as an engineer very fulfilling, but not find satisfaction working as a manager because the job requires a high level of interpersonal interaction and dependence on others. In contrast, a person with high leadership needs might find a management position more satisfying than working as an engineer. Second, some engineers find it hard for them to give up the technical role as they move into management, especially if they are good at it. Third, some engineers may lack interpersonal skills such as communication with supervised employees or organization skills necessary to make a successful transition into management. Organization skills include the willingness and ability to make decisions such as promotion or firing of supervised employees (Al-Faleh, 1993; Levinson, 1994).

Another major study comparing engineers and managers examined 71 male employees of three high-tech industries, divided into three comparison groups: engineers,

engineering-trained-managers, and non-engineering-trained managers on personality traits (Brown, Grant, & Patton, 1981). An analysis of California Psychological Inventory (CPI) results showed that non-engineering managers scored significantly higher than engineers on dominance (controlling and aggressive behavior), capacity for status (ambition and need for achievement), and social presence (assertiveness). Engineer-turned-managers also scored significantly higher than engineers on dominance. According to the authors, the results suggest that, relative to engineers, managers are more outspoken, socially oriented and express enjoyment and ease in interacting with others.

Sedge's (1985) results support the Brown et al. (1981) study. Her research compares two groups of engineers: a) those who continue to pursue a technical career, and b) those who make a career transition into management. After measuring needs, interests, and job satisfaction variables for engineers, she found that engineer-turned-managers scored significantly higher in affiliation and dominance needs than the engineers. Engineers, in turn, scored higher in investigative interest needs, which is the interest in exploring and research for problem solving. In addition, the results showed that the achievement needs of engineer-turned-managers was predictive of job satisfaction for this group. The investigative and artistic needs were predictive of job satisfaction for engineers.

The results of these studies (Sedge,1985; Brown et al., 1981) showed that there

are differences between the job needs of managers and engineers. The different job needs of these two groups can be seen in the different tasks they performed in their jobs. In the engineer group, the engineer needs the job task to be technical, mathematically related, and precise (Hogan, 1994; Levinson, 1994). For the engineer-turned-manager group the job needs tends to lean more toward the development of the organization. The difference between job needs is the dividing line that differentiated engineers and engineer-turned-managers.

Job satisfaction

The studies mentioned above illustrate the concerns of both the individual and the organization about job satisfaction. According to Blauner (1966), the highest percentage of satisfied workers is usually found among professionals and businessmen. Is this true with the engineer-turned-manager population? This is one of several questions this research seeks to answer. Measuring job satisfaction is not simple by any means because it is a complex and multidimensional concept. One can measure job satisfaction for different occupational status groups, different work setting groups, gender, individual psychological characteristics, etc. (Malinowska-Tabaka, 1987). But to further understand the basic concept of job satisfaction one must understand the theory behind job satisfaction.

Two theories that cover satisfaction are Maslow's hierarchy of needs and

Herzberg's two-factor theory. Maslow's needs theories is based on a pyramidal hierarchical level of needs. There are five levels of needs: physiological, security and safety, love and belonging, self-esteem, and self-actualization. According to Maslow's theory of motivation, the lower needs must be filled before one is motivated to move on to satisfy the next level of needs. Simply stated, Maslow's needs theory as applied to job satisfaction says that as the lower needs are satisfied, the higher-level needs become the stronger motivator of behavior. Maslow's levels of needs seem to demonstrate the natural career progression of engineers. As the lower-level needs of the engineer are satisfied, they are motivated to fill their higher level of needs, i.e. to further their career by pursuing better organizational status, better pay, and greater security (Al-Faleh, 1994; Badawy, 1983; Bailyn, 1980; Roth, 1982).

Herzberg's motivation-hygiene theory divides job satisfaction into two factors: extrinsic and intrinsic (Kovach, 1989). The extrinsic factors are pay, working conditions, and job security. These extrinsic factors will result in job dissatisfaction if they are not met. At the same time, these factors might not contribute to job satisfaction if they are met because they merely prevent dissatisfaction. Intrinsic factors are self-development, challenging work, autonomy, status, and authority. These are the actual motivators because they fulfill an individual's need for psychological growth. Herzberg's theory also states that in order to reach job satisfaction, all extrinsic factors must be met and satisfied

before a person can work on the motivators. According to this theory, in order for the engineers to achieve job satisfaction, not only the extrinsic factors (working conditions and pay) must be satisfied, but the motivator factors must be satisfied as well. The deficiency of either intrinsic or extrinsic factors results in dissatisfaction among engineers. This, in turn, may lead the engineer into another career path, in this case, the management path.

Young's (1992) study supports both Maslow's and Herzberg's job satisfaction theories. Young found that in the early stages of a career, the majority of individuals studied chose to enter the ranks of management purely for self-development. This reflects Maslow's needs hierarchy that once individuals satisfy their lower needs, they are motivated to satisfy their higher needs. Also, as they make the transition into management, extrinsic factors such as pay are no longer cited as most important (Sherman, 1989). In this phase, intrinsic factors become the primary motivation. In another study examining Herzberg's theory, House and Wigdor (1975) found that both extrinsic and intrinsic factors can create job satisfaction. The finding that extrinsic factors can create job satisfaction is contradictory to Herzberg's two-factor theory. House and Wigdor (1975) found that job functions, education, gender, occupation, and level in the organization determine job satisfaction. Another finding was that intrinsic job factors are more important to both satisfying and dissatisfying job situations.

According to all these theories there are many factors that influence job satisfaction for an employee. As mentioned previously, some of the factors that are predictive of job satisfaction have been identified as investigative needs for the engineer and achievement needs for the engineer-turned-manager. In addition, there are other personality factors that still need to be examined which affect job satisfaction for these two groups. It is the intent of this research to examine these additional personality traits.

Personality

One of the purposes of this study is to investigate the relationship between personality needs and job satisfaction. As mentioned earlier, intrinsic factors play a more important role in job satisfaction (Sherman, 1989). Based on this evidence, it will benefit the study to identify personality needs that will predict job satisfaction. If this study's thesis is supported, it can be used as the basis of a selection tool for training and promotion of engineers and engineer-turned-managers.

Several studies have identified personality traits that are predictive of job satisfaction. For example, Gellatly et al. (1991) found that managers scored high in affiliation, sociability, and dominance. Harrell and Stahl (1981) found that managers scored higher than engineers on traits associated with power, dominance, and extroversion. Bray and Howard (1983) showed that certain personality traits, such as the need for advancement and personal work standards, are linked with managers. The above

mentioned personality traits are believed to be indicators of successful performance in managers.

Sociability and Dominance. Both the dominance and sociability scales have been shown to be predictors of leadership, or in this case a necessary component of management. Sociability is defined as the needs and the skills to interact with members of the group (Gellatly et al., 1991; Sherman, 1989). The sociable manager would be one that exhibits comfort and confidence when interacting with others. In addition, the sociable manager would have good communication and public speaking skills. In contrast, a non-sociable or low-level sociable manager would have a difficult time interacting with others in a group and might feel uncomfortable when speaking in public.

The dominance factor is defined as the need to direct or control the activity of the members of the group. A dominant manager is one who is confident, competitive, outspoken and shows a greater preference for acting upon and through other people. In contrast, a less dominant manager would be reluctant to exercise authority and possibly reluctant in directing the activities of his or her subordinates. According to Gellatly et al. (1991), these personality traits are predictive of job satisfaction for managers. This predictability is generalized across the population. In a study comparing the need for power and the need for dominance, the results showed that individuals who scored high on the dominance scale show a strong sense of security and effective, non-defensive styles

of power-seeking in small groups (Pratto, Sidanius, Stallworth, & Malle, 1994). In career goals, individuals scoring high on the social and dominance scale tend to seek hierarchy-enhancing professions, such as managerial positions.

Personality and job satisfaction

It seems that most indicators point toward dominance and sociability as two potential predictors of managerial potential. But this research seeks also to determine if these personality factors are predictive of job satisfaction among engineer-turned-managers. Guion and Gottier (1965) concluded that, taken as a whole, there is no generalizable evidence that personality measures can be recommended as good or practical tools for employment selection. One of the reasons why personality measures have not always been to be shown consistently to predict job behaviors is that the measured traits are often mismatched with the performance criteria (Jackson, 1986). But more recent research performed by Barrick and Mount (1991) showed that personality dimensions are predictive of job performances for different careers.

Gellatly et al. (1991) theorized that personality measurements are important in predicting both job performance and job satisfaction. The reasoning was that an individual possessing personality traits or interests consistent with the job requirements would be more satisfied than those scored low on these personality traits. Basically, an individual is more satisfied when performing job functions that fit his or her personality

and skills. Other researchers concur with this theory. Significant relationships were found between job satisfaction and personality factors in these studies (Cawsey, Reed & Reddon, 1982; Day & Silverman, 1989; Sedge, 1985).

It is one of the assumptions of this research that these personality factors play an important role in the level of job satisfaction for engineer-turned managers more than engineers. As indicated, the two personality factors under examination are sociability and dominance. Research has shown that these two personality factors are an important factor in the manager's effectiveness (Pratto, Sidanius, Stallworth, & Malle, 1994; Sherman, 1989). It has been demonstrated that individuals who possess these qualities often seek out managerial positions. For the engineer group, these personality factors are not predictive of job satisfaction.

Based on these findings on personality factors and job satisfaction, one can come to the conclusion that these two groups have significant differences in their personality factors. The differences in turn will affect their level of job satisfaction. For example, an engineer-turned-manager who scores high in both the sociability and dominance personality scales would report a higher rate of job satisfaction. But an engineer with a similarly high score on these two scales would report a low level of job satisfaction because of their lack of managerial responsibility. The similar scores, but different satisfaction results can be explained by the fact that the engineer-turned-managers had

attained responsibilities that allowed them to utilize their skills. But those professionals working as engineers who also had high dominance and sociability scores would report a lower level of job satisfaction because their positions do not reflect their skills. Putting this in the context of the two theories of job satisfaction, one can say that these engineer-turned-mangers had satisfied their security needs (Maslow) and/or they had satisfied their intrinsic factors (Herzberg) (Al-Faleh, 1994; Badawy, 1983; Bailyn, 1980; Kovach, 1989; Roth, 1982). The opposite would be true for the engineer group who scores high in dominance and sociability, because they have not yet satisfied this level of needs.

Current study

This study proposes that the differences in job satisfaction levels among engineer-turned-managers and engineers are the result of personality differences. The study focuses on dominance and sociability factors. Thus, the hypotheses are:

1. The engineer-turned-manager group has a significantly higher score on the dominance personality scale than the engineer group.
2. The engineer-turned-manager group has a significantly higher score on the sociability scale than the engineer group.
3. In the engineer-turned-manager group there is a positive and significant relationship between the personality scale (dominance and sociability) and job satisfaction scale.

4. In the engineer group there is a negative and significant relationship between the personality scale (dominance and sociability) and job satisfaction scale.

The studies cited above point out that job satisfaction is the result of fulfilling one's needs and values. Since job satisfaction is determined by several factors, such as occupation, job tasks, and personal needs, examining how these factors relate to personality traits can explain why some engineer-turned-managers and engineers have greater job satisfaction than their peers. The purpose of this research is to seek a possible answer to the questions of why some engineers and engineer-turned managers are satisfied with their roles in the organization and some are not. Another critical issue is the finding of similarity or dissimilarity of the two groups on their personality factors. It is possible that a satisfied engineer may share some similar personality characteristics with an unsatisfied engineer-turned-manager. In this context, it is assumed that job satisfaction is not the result of particular job tasks or occupational differences, that the engineer-turned-managers are generally performing similar functions even though they might hold different titles and work at different organizations.

Method

Pilot Study

In the pilot phase, the survey was administered to ten randomly selected individuals. The purpose of the pilot study was to evaluate the completion time, format

and understandability of the questionnaire. Participants reported that the questions were easy to understand and it took approximately 45 minutes to complete. Most participants said that they would not participate in the research if the survey were any longer.

Participants

There were 55 participants in this study. The participants were professionals working in the Silicon Valley. All of the participants were engineers or engineer-turned-managers working in different industries, ranging from software to hardware engineering. The average age for the participants was 41 years. The sample consisted of 14% female ($n = 8$) and 86% male ($n = 47$). The ethnicity of the participants was 4% African American ($n = 2$), 24% Asian ($n = 14$), 70% Caucasian ($n = 40$), and 2% Hispanic ($n = 1$). In addition, 63% of the participants held a BS/BA ($n = 36$) and 37% had a higher degree ($n = 19$); including 7% with a Ph.D ($n = 4$). The participants' degrees ranged from electrical engineering to mathematics. In addition, 21% of the participants held second degrees ($n = 12$), such as electrical engineering, finance, and public administration. Twenty one percent of the total participants were enrolled to obtain higher degrees ($n = 12$), such as an MBA at the time of the data collection.

Materials

Two validated instruments: the Personality Research Form (PRF) and the Job Descriptive Index were used in the present study to measure personality factors and job

satisfaction level.

Personality Factors. The first instrument is the Dominance and Sociability subscales of the Personality Research Form (PRF) (Jackson, 1974). Each of the subscales contained 16 true/false questions. This instrument has been validated repeatedly (Conn & Ramanaiah, 1990; Beesmer & Ramanaiah, 1981; Bridgewater, 1981). In addition, the PRF has also been validated among other ethnic groups (Fekken & Holden, 1987). This instrument was chosen for the validity of its subscale, Dominance and Affiliation.

Job Satisfaction. This study used the modified version of the Job Descriptive Index to measure the job satisfaction level of the engineers and engineer-turned-managers (Smith, Kendall, & Hulin, 1969). The reason for using the modified version is that it has 30 yes/no questions, as opposed to the long version, which has 72 questions. The shorter version is just as valid and reliable as the longer version. It also covers the five factors of job satisfaction that are pertinent to the research: work, pay, promotions, supervision, and co-workers. This version has also been subjected to validation studies (Gregson, 1987, 1990).

Demographics

Demographic questions were included in order to obtain background and training information of the participants. These questions include gender, race/ethnicity, education, and long-term career objectives of the participants.

Design and Procedures

As part of the survey, participants were asked to sign the Human Subject Consent Form, stating their participation in the research was voluntary. After signing the consent form, the participant was given a survey packet, which included demographic questions, the two subscales, and job satisfaction questions.

Result

Table 1 shows the personality scores for the dominance, sociability and job satisfaction scales for the engineer and engineer-turned-manager participants. It is clear that the engineer-turned-manager group (n =13) had a significantly greater average score (M = 11.46) than the engineer group (n = 43), (M = 8.54) on the dominance scale $F(1, 55) = -3.79$, $p<.001$. The result of the t-test for independent samples supports the first hypothesis, that engineer-turned-managers had significantly higher dominance personality scores than the engineers.

The engineer-turned-manager group (n = 13) also had a higher mean (M = 10.15) than the engineer group (n = 43), (M = 8.93) on the sociability scale, but not high enough to be significant $F(1,55) = -1.15$, $p>.05$. The non-significant result does not support the second hypothesis, that the engineer-turned-manager group has a significantly higher sociability score than the engineer group. This leads to the possible conclusion that there is no measurable difference on the sociability characteristic between the between the two

Table 1

Personality and Job Satisfaction Assessment

of Engineer Versus Engineer-Turned-Manager Participants

	Engineer			Engineer-Turned-Manager		
Personality Factors and Job Satisfaction	n	M	SD	n	M	SD
Dominance	44	8.54	3.40	13	11.46	2.07
Sociability	44	8.93	3.16	13	10.15	3.99
Work Satisfaction	43	23.35	3.81	12	24.50	2.02
Pay Satisfaction	43	19.79	3.24	13	20.92	2.81
Advancement Satisfaction	42	18.62	5.63	12	20.83	5.73
Supervision Satisfaction	43	22.51	3.75	12	21.25	3.89
Satisfaction W/ Co-workers	43	23.42	3.22	12	23.92	2.50

groups of participants.

Correlations between the job satisfaction scale and personality factors for engineer-turned-manager are presented in Table 2. It was hypothesized that the personality factors, dominance and sociability would correlate positively with the job satisfaction subscales for the engineer-turned-manager. The results of the correlation show that there are some positive relationships between the sociability and job satisfaction, but they are not significant. The correlation between sociability factor and work satisfaction scale was .45, $p>.05$. The strength of the relationship is moderate. This is an indication that engineer-turned-managers who reported a high level of work satisfaction also reported a high level of sociability. The correlation between sociability factor and advancement satisfaction for the engineer-turned-manger was .51, $p>.05$ which is a moderately strong relationship. This is another indicator that engineer-turned-manger who scored high on advancement satisfaction also scored high on the sociability factor. The correlation between sociability factors and satisfaction with coworkers was .46, $p>.05$. This is another moderately strong relationship which is an indication that engineer-turned-managers who were satisfied with their relationships with their co-workers also had a more sociable personality.

For the dominance factors and job satisfaction, although all of the correlations were positive, they were not significant. There was only one moderately strong correlation. The correlation between dominance factors and pay satisfaction with

Table 2

Correlations Between Job Satisfaction and Personality Factors for Engineer-Turned-Managers (N = 13)

Subscale	1	2	3	4	5	6	7
1. Work Satisfaction	--	-.06	.39	-.24	.42	.24	.45
2. Pay Satisfaction		--	.65*	-.25	.61*	.32	.21
3. Advancement Satisfaction			--	.08	.68*	-.16	.51
4. Supervision Satisfaction				--	.02	.02	-.19
5. Satisfaction W/ Co-workers					--	.16	.46
6. Dominance Factors						--	-.27
7. Sociability Factors							--

* Correlation is significant at the 0.05 level (2-tailed).

coworkers was .32, $p>.05$. This is an indication that engineer-turned-managers who were satisfied with their pay also had a more dominant personality.

The non-significance of the correlations is possibly due to the small sample size of this population ($n = 13$). These results could still be an implication that for engineer-turned-managers, a sociable personality may be a contributing factor to their level of job satisfaction.

There are some significant relationships among the job satisfaction subscales. The correlation between pay satisfaction and advancement satisfaction subscales was .65, $p<.05$. The correlation between pay satisfaction and satisfaction with co-workers was .61, $p<.05$. and the correlation between advancement satisfaction and satisfaction with co-workers was .68, $p<.05$. These results suggest that for the engineer-turned-manager there is a positive relationship between the salary, advancement, and co-worker satisfaction scales. This is an indication that there is a linear relationship among these scales and they are predictors of job satisfaction. These results also imply that the engineer-turned-manager's level of satisfaction is based on pay. The higher they are paid, the stronger the likelihood that they will have a higher level of satisfaction with co-workers and advancement. It is the same indication concerning the relationship between advancement and co-worker satisfaction. The higher level of advancement satisfaction will also result in a higher level of satisfaction with co-workers. Based on these interpretations, it could be

concluded that engineer-turned-managers base their job satisfaction mainly on the two job satisfaction subscales: pay and advancement. Another conclusion is that there is a linear relationship among these scales.

The last hypothesis of our research was that for engineers there are negative correlations between the job satisfaction scale and personality factors. The results are presented in Table 3. The correlations show that although there are some relationships between the dominance and sociability factors and the job satisfaction scale, they are too small to be of any statistical significance. They are as follows: dominance and advancement satisfaction $r = -.28$, $p > .05$; sociability and advancement satisfaction $r = .24$, $p > .05$; sociability and work satisfaction .15 ($p > .05$); and sociability and pay satisfaction $r = .15$, $p > .05$. These non-significant relationships might be due to the low number of participants ($n = 43$). The results showed that there is only one significant negative correlation. The other two significant correlations are positive. The positive correlation results do not support the hypothesis.

The engineers also show some significant relationships among the job satisfaction subscales similar to the engineer-turned-manager group. For the engineer group, the correlation between pay satisfaction and work satisfaction subscales was .40, $p < .01$. The correlation between pay satisfaction and advancement satisfaction was .50, $p < .01$. The advancement satisfaction scale also showed significant relationships to the work

Table 3

Correlations Between Job Satisfaction and Personality Factors for Engineers (N = 43)

Subscale	1	2	3	4	5	6	7
1. Work Satisfaction	--	.40**	.49**	.39*	.44**	.03	.15
2. Pay Satisfaction		--	.50**	.22	.26	-.03	.15
3. Advancement Satisfaction			--	.17	.14	-.28	.24
4. Supervision Satisfaction				--	.17	-.05	.02
5. Satisfaction W/ Co-workers					--	-.01	-.04
6. Dominance Factors						--	.21
7. Sociability Factors							--

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

satisfaction and the supervision satisfaction subscales: .49, $p<.01$ and .31, $p<.05$. The four significant correlations involve the four job satisfaction subscales: pay satisfaction, advancement satisfaction, work satisfaction and satisfaction with supervisor. The common denominators are pay and advancement. For this group, the higher the level of satisfaction with pays, the higher the satisfaction with advancement and work. This is similar to the relationships observed between advancement satisfaction, work satisfaction and supervision satisfaction. The results indicate that the for the engineer group, the higher the level of satisfied with their advancement in the organization, then the higher their satisfaction will be with work and supervision.

T-test for independent samples was also performed for each of the job satisfaction subscales: work satisfaction $F(1, 55) = -1.00$, $p>.05$; pay satisfaction $F(1, 55) = -1.14$, $p>.05$; advancement satisfaction $F(1,55) = -1.20$, $p>.05$; satisfaction with supervisor $F(1,55) = 1.02$, $p>.05$; and satisfaction with coworkers $F(1,55) = -.49$, $p>.05$. There were no demonstrated significant differences between the two groups' levels of job satisfaction, as indicated by the above statistics. There was also no hypothesis presented concerning the two groups satisfaction scores, but the results are an indication that both groups experience a similar level of job satisfaction. There is also an observed trend for the engineer-turned-manager group to have higher mean scores in all five subscales of job satisfaction.

Discussion

The primary purpose of the study was to determine if there were any significant differences in dominance and sociability personality factors between engineers and engineer-turned-mangers. In addition, the study examines the relationship between job satisfaction and personality factors for these two groups of participants. The study's four hypotheses were: 1) the engineer-turned-manager group had a significantly higher score on the dominance scale than the engineer group; 2) the engineer-turned-manager group had a significantly higher score on the sociability scale than the engineer group; 3) for the engineer-turned-manager group there would be a positive and significant relationship between the personality scale (dominance and sociability) and job satisfaction; 4) for the engineer group there would be a negative and significant relationship between the personality scale (dominance and sociability) and job satisfaction.

Summary and implication of findings

The results of the present study support one of the four hypotheses. The hypothesis that engineer-turned-managers would score significantly higher than engineers in the dominance score was supported by the data. This finding is consistent with Pratto, Sidanius, Stallworth, & Malle's finding (1994) where it was found that individuals who score high on the dominance scale tend to seek hierarchy-enhancing professions, such as managerial positions.

Another important result was the finding of non-significant sociability differences

between the engineer-turned-manager and the engineer groups. This result may indicate changes in the way engineers are viewed by society and also in the personality types of people entering the engineering professions. For years, the word "engineer" conjured up an image of a socially awkward, overly intellectual personality type (a nerd). This may no longer be the popular perception for the simple fact that as technology advances and becomes a more lucrative field, it attracts a more diverse group of people. Thus, sociability may be becoming less important of a personality trait when trying to differentiate motivation for pursuing careers in engineering or engineering management. Alternatively, the non-significant result could be due to the small sample. Therefore, the above conclusion should be interpreted with caution.

Although there were non-significant correlations between personality and job satisfaction, there were significant correlations among the job satisfaction subscales. For both groups of participants, the positive significant correlations involve at least one of the two subscales: pay satisfaction or advancement satisfaction. This has major implications for organizations operating in the Silicon Valley. In this geographic area, companies operate in a highly competitive job market. To recruit and maintain human resources, companies often have to offer large pay raises as well as promotions. This competitiveness could have an adverse impact on the individual and the organization.

The finding that engineer-turned-managers have a significantly higher dominance score than engineers leads to the postulation that managers inherently possess a higher degree of dominant personality. This leads to a more important question of whether or

not promotion should be based not only performance, but also on personality factors.

This result is in no way meant to suggest that promotion should be based solely on a candidate's level on a personality scale. Dominance is just one of many factors of an individual's personality make-up. Although it has been shown that the Extraversion personality dimension is predictive of job performance for managerial and sales careers, it has not been shown that a highly dominant personality is predictive of job performance as a manager (Barrick & Mount, 1991). There are also other factors that the research has not covered which could affect success in the managerial field. In addition, the practice of promoting employees based solely on personality would not be advisable.

For both groups of participants, the positive significant correlations involve at least one of the two subscales: pay satisfaction or advancement satisfaction. This is a strong implication that pay and advancement within an organization plays an important role in the level of job satisfaction for both managers and engineers. The implication of this finding to an organization is crucial. For an organization to develop or improve employee's job satisfaction, the first step is to develop an equitable payment and advancement system. This sounds simplistic, but it can be difficult to apply because the company might be faced with limited resources or limited promotion opportunities. The options for these organizations to boost employees' job satisfaction might be to offer more non-monetary incentives such as flex-time, part-time work with health benefits, telecommuting, or more available time off with or without pay.

To maintain job satisfaction among engineers who do not want to (or cannot

successfully) move into management, another alternative is possible: the development of two alternative but equivalent tracks for engineering careers within the organization — one track for engineering management development and the other for the development and incentives for senior engineers who do not want to move into management.

Possession of a dominant personality does not mean that one is automatically well equipped for the management position. A lack of management skills can often be addressed by training and preparation for the role. The most important preparation is management training for the engineer before transfer into a managerial role. The training should include the expectations and tasks of the job. Several methods of training are included here: mentoring, job shadowing, and internship for the engineers who are in business school. These tools could also be used as a discovery process for the employee who is undecided about their career options. These programs can help facilitate the employee's career decisions and can also help foster job satisfaction by providing a chance to participate in the determination of their career path.

The results and implications of these findings point to an invaluable line of further research that would be of great interest as today's technology sectors are expanding at an unprecedented rate. Competition for qualified engineers, and engineering managers is fierce among high-tech companies, making employee retention a high priority. As engineering job satisfaction issues, job turn-over, and engineering management questions become more and more pressing in this extremely tight engineering job market, both large and small technology companies will need to take these concerns into account as they develop human resource strategies that will facilitate both individual and corporate

growth.

Strengths and weaknesses

The use of validated scales for the measurement of both personality and job satisfaction factors creates a reliable benchmark for examination of these somewhat nebulous human traits, making it possible to relate and compare this study's findings and conclusions with those of other related studies.

Another strength of the study is the geographical area of the participants. All of the study participants are recruited from different organizations in the Silicon Valley, where there is a concentration of technology-oriented businesses. The centralization of this business sector attracts a large and diverse pool of engineers from all parts of the Untied States.

Another encouraging outcome lies in the fact that although the sample size was small, there were significant results for some of the hypotheses, especially regarding the dominance personality scale. This is a positive indicator that with a larger sample size other significant relationships will be discovered between the two groups.

The main limitation of the study is the small sample size, especially for the engineer-turned-manager group (n =13). Even though the data were collected in Silicon Valley, the technology center of the United States, one of the main problems is the strict criterion for the group, where the individual had to be and engineer prior to becoming a manager. Additionally, with the workload of the typical engineering manager, filling out a lengthy study may not be a high priority.

The small sample size also affects the data analysis in several other ways. The

study is more vulnerable to extreme values. It also makes it more difficult to find significance and relationships for the correlation. Although there was a positive correlation between the personality scale and the job satisfaction subscales for the engineer-turned-manager group, they were not statistically significant. There are two possible explanations for this outcome: this is the actual relationship; or a higher number of participants would be required for the research to provide conclusive results. In short, with only 13 participants meeting the criteria of engineer-turned-manager, the analysis of the results of the data may be affected in various ways by the small sample size.

Suggestions for future research

Among the results of this research is the indication that the engineer-turned-manager has a higher dominance score than the engineer. The research did not measure job performance of these individuals. The next logical step for further research would be to study the relationship between personality and job performance for this group. It would be very informative to see if the dominance personality is predictive of job performance for particular types of jobs. Another study of interest would be a comparison of the personality traits of engineer-turned-managers to managers who come from a non-engineering background, such as business. This would help in the development of a "successful" manager personality profile, possibly answering some long-standing questions regarding whether engineering managers with no technical background are as successful as engineer-turned-managers. This personality profile, used in conjunction with other selection tools, could help organizations to better identify promising candidates for management.

To take the research to the next step, further studies should focus on the relationship between measured job performance, job satisfaction and personality factors. Is there a measurable relationship between performance and satisfaction? And what role do personality factors play in this relationship?

Another factor that might affect the analysis was the collection site. The data were collected in 1999 among professionals working in the Silicon Valley, one of the most rapidly growing technological and economically prosperous areas of the nation. It was expected for these participants to report high level of job satisfaction, especially related to pay and advancement satisfaction. This raises another interesting question about how economic factors play a role in job satisfaction. Another potentially rewarding research area would be to focus on the measuring of job satisfaction in relation to the economy of the study's geographical area. The investigation of this relationship would lead to a better understanding of job satisfaction.

Conclusion

Overall, the results of this research are preliminary. They should be used to contribute some small amount of understanding on personality in the area engineering employment. Additional research is needed to further expand this area of knowledge in the context of human resources. The logical focus for further research would be the expanded examination of the relationship between personality, job performance and job satisfaction. This research could eventually play an important role in employment selection, promotion and compensation.

In general, the finding of this study supports the theory that there are personality

differences between engineers and engineer-turned-managers. The implications of these findings can be applied in areas with as narrow a focus as employee job performance evaluation models, or in areas as broad as long-term career advancement strategies within engineering organizations. While personality profiles probably cannot be legally or ethically used in advancement considerations, there is no doubt that continued research in this area would yield a wide range of valuable data that could be used to strengthen engineering management techniques in both large and small companies.

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Appendix A

SURVEY RESEARCH

DEMOGRAPHIC

Please provide the following information about yourself:

1. **ID:** _____
   (to be filled out by test administrator)

2. **Name:** _____
   (optional)

3. **Gender:** ☐ Male ☐ Female

4. **Birth date:** _____ **Age:** _____

5. **Ethnicity:** Check all that apply

   ☐African American ☐Latino/na

   ☐Asian/PI ☐Native American

   ☐Caucasian ☐Other (Please specify): _____

6. **Current Educational Degree:** Please checks all the boxes that apply. (Remember, you already have these degrees.)

   ☐BS/BA _____ (Please fill in the major.)

   ☐MS/MA _____ (Please fill in the major.)

   ☐MBA _____ (Please fill in the major.)

   ☐Ph D _____ (Please fill in the major.)

   ☐Other _____ (Please fill in the major.)

7. **Continuing Educational Degree:** Please checks all the boxes that apply. (Remember, you are **currently** in school to obtaining these degrees.)

   ☐BS/BA _____ (Please fill in the major.)

   ☐MS/MA _____ (Please fill in the major.)

   ☐MBA _____ (Please fill in the major.)

   ☐Ph D _____ (Please fill in the major.)

   ☐Other _____ (Please fill in the major.)

8. **Future Objective Educational Degree:** Please checks all the boxes that apply. (Remember, you are **planning** to obtain these degrees.)

   ☐BS/BA _____ (Please fill in the major)

   ☐MS/MA _____ (Please fill in the major)

   ☐MBA _____ (Please fill in the major)

   ☐Ph D _____ (Please fill in the major)

   ☐Other _____ (Please fill in the major)

9. What industry are you working in: _____

10. Please give your job title:_____

11. Please describe your job in a few short sentences:

    _____

    _____

    _____

    _____

    _____

12. Would you say that your job function is more:
☐ Technical or ☐ Managerial

13. Five years from now, which functions do you see yourself in?
☐ Technical or ☐ Managerial

JOB SATISFACTION

There are 30 questions in this section that ask about your level of job satisfaction at work. Please check the answer that best describes your level of satisfaction.

14. My work is satisfying.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

15. My work is boring.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

16. My work is good.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

17. My work is tiresome.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

18. My work is challenging.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

19. My work gives me a sense of accomplishment.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

20. My income is adequate for normal expenses.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

21. I am underpaid.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

22. My pay is bad.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

23. My pay is less than I deserve.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

24. I am highly paid.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

25. My income is barely enough to live on.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

26. There are good opportunities for advancement at my organization.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

27. Opportunities are somewhat limited at my company.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

28. Promotions are based on ability at my organization.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

29. My job is a dead-end job.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

30. There is a good chance for promotion at my company.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

31. My company has an unfair promotion policy.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

32. My supervisors are hard to please.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

33. My supervisors are impolite.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

34. My supervisors are tactful.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

35. My supervisors are annoying.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

36. My supervisors are quick-tempered.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

37. My supervisors are stubborn.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

38. My co-workers are boring.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

39. My co-workers are slow.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

40. My co-workers are stupid.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

41. My co-workers are intelligent.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

42. It is easy to make enemies of my co-workers.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

43. My co-workers are lazy.
☐ Strongly Disagree ☐ Disagree ☐ Neither ☐ Agree ☐ Strongly Agree

PERSONALITY SCALES

There are 32 questions in this section that ask about your personality traits. Please check the answer that best describes you.

44. I feel confident when directing the activities of others.
☐ True ☐ False

45. I am quite independent of the people I know.
☐ True ☐ False

46. I seldom put out extra effort to make friends.
☐ True ☐ False

47. I would like to be a judge.
☐ True ☐ False

48. I choose hobbies that I can share with other people.
☐ True ☐ False

49. I would make a poor military leader.
☐ True ☐ False

50. I go out of my way to meet people.
☐ True ☐ False

51. I don't really have fun at large parties.
☐ True ☐ False

52. I try to control others rather than permit them to control me.
☐ True ☐ False

53. I avoid positions of power over other people.
☐ True ☐ False

54. People consider me to be quite friendly.
☐ True ☐ False

55. I don't like people to joke about what they feel are my weakness.
☐ True ☐ False

56. I would not be very good at a job which required me to meet people all day long.
☐ True ☐ False

57. I would like to play a part in making laws.
☐ True ☐ False

58. I truly enjoy myself at social functions.
☐ True ☐ False

59. When I see someone I know from a distance, I don't go out of my way to say hello.
☐ True ☐ False

60. I have little interest in leading others.
☐ True ☐ False

61. In an argument, I can usually win others over to my side.
☐ True ☐ False

62. I spend a lot of time visiting friends.
☐ True ☐ False

63. I feel uneasy when I have to tell people what to do.
☐ True ☐ False

64. Sometimes I have to make a real effort to be sociable.
☐ True ☐ False

65. The ability to be a leader is very important to me.
☐ True ☐ False

66. My friendships are many.
☐ True ☐ False

67. I don't spend much of my time talking with people I see everyday.
☐ True ☐ False

68. Most community leaders do a better job than I could possibly do.
☐ True ☐ False

69. I trust my friends completely.
☐ True ☐ False

70. I am quite effective in getting others to agree with me.
☐ True ☐ False

71. I am not very insistent in an argument.
☐ True ☐ False

72. Often I would rather be alone than with groups of friends.
☐ True ☐ False

73. I would not want to have a job enforcing the law.
☐ True ☐ False

74. I try to be in the company of friends as much as possible.
☐ True ☐ False

75. I would like to be an executive with power over others.
☐ True ☐ False